

**WE CLAIM:**

52. A method for debugging a program in real time and while  
said program is executed by a programmable logic controller, said  
method comprising the steps of:

displaying a section of said program indicated by a user to be  
debugged;

saving original compiled code of said program;

compiling said section of said program to be debugged in  
another section of memory;

jumping to said another section of said memory during  
execution of said program when an instruction indicated to be  
debugged is to be executed; and

capturing a status of said instruction as it is executed, wherein  
said program is debugged in real time and while said program is  
executed by said programmable logic controller.

53. The method according to claim 52, further comprising the  
step of returning to said original compiled code of said program after  
said instruction indicated to be debugged is executed.

54. The method according to claim 53, further comprising the  
step of restoring said original compiled once said status is captured.

09732570.051001

55. The method according to claim 52, further comprising the step of instrumenting each instruction compiled in said another section of memory.

5 56. The method according to claim 52, further comprising the step of storing a table relating instructions to relatively fastest boolean expressions, wherein said instructions are debugged relatively faster with said fastest boolean expressions.

10 57. The method according to claim 52, further comprising the step of providing a table of pointers to instructions of said original compiled code, wherein said instructions are located in memory relatively faster during debugging.

15 58. The method according to claim 52, further comprising the step of limiting a data size of each compiled instruction, wherein execution of said instructions to be debugged is relatively faster and memory required to store said instructions is minimized.

20 59. An apparatus that debugs a program in real time and while said program is executed by a programmable logic controller, said method comprising the steps of:

25 an area of memory for saving original compiled code of said program;

another area of memory for storing a compiled section of said program to be debugged;

30 a branch that causes execution of said instruction to jump from said original compiled code to said another section of said memory

09732578.051001

during execution of said program when an instruction indicated to be debugged is to be executed; and

5 a circuit for capturing a status of said instruction as it is executed, wherein said program is debugged in real time and while said program is executed by said programmable logic controller.

10 60. The apparatus according to claim 59, further comprising a display for displaying said instructions to be debugged.

15 61. The apparatus according to claim 60, further comprising a table relating instructions to relatively fastest boolean expressions, wherein said instructions are debugged relatively faster with said fastest boolean expressions.

20 62. The apparatus according to claim 59, further comprising a table of pointers to instructions of said original compiled code, wherein said instructions are located in memory relatively faster during debugging.